AUTOSCOPY
OF THE
LARYNX AND TRACHEA

KIRSTEIN-THORNER

AUTOSCOPY

OF THE

LARYNX AND THE TRACHEA.

(DIRECT EXAMINATION WITHOUT MIRROR.)

BY

ALFRED KIRSTEIN, M.D.,

BERLIN.

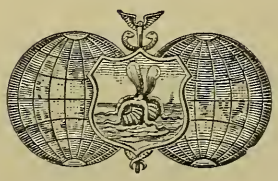
AUTHORIZED TRANSLATION (ALTERED, ENLARGED, AND REVISED BY THE AUTHOR) BY

MAX THORNER, A.M., M.D.,

CINCINNATI, O.,

PROFESSOR OF CLINICAL LARYNGOLOGY AND OTOLOGY, CINCINNATI COLLEGE OF MEDICINE AND SURGERY; LARYNGOLOGIST AND AURIST, CINCINNATI HOSPITAL, ETC.

WITH TWELVE ILLUSTRATIONS.



PHILADELPHIA.

THE F. A. DAVIS CO., PUBLISHERS.

1897.

Philadelphia, Pa., U. S. A.:
The Medical Bulletin Printing-House,
1916 Cherry Street.

TO

J. SOLIS-COHEN, M.D.,

OF PHILADELPHIA,

THIS TRANSLATION IS DEDICATED,

IN

GRATEFUL RECOGNITION OF MUCH PERSONAL KINDNESS,

BY

THE TRANSLATOR AND EDITOR.

PREFACE.

Ever since the time when progressive minds first endeavored to get a view of the interior of the human larynx they have been under the impression that the way from the mouth to the vocal cords, according to existing anatomical conditions, must of necessity form an angle. Under the influence of this conception, the truth of which no one ever seemed to doubt, no plan could have been conceived other than the one which finally, in the sixth decade of our century, resulted in the discovery of laryngoscopy by Garcia, Turck, and Czermak,—namely, to overcome this difficulty by means of a reflecting apparatus (a mirror) placed at the apex of the angle, or the introduction, into medicine, of the laryngoscope, the laryngological technique entered upon a path of development from which it has hitherto not departed in the slightest degree. The introduction of endolaryngeal surgery by Victor Bruns was the next brilliant development of Turck's and Czermak's great

invention. Cocaine has freed laryngological surgery from its many difficulties without at all changing its method. Thus, there has been but one creative thought which has hitherto directed all our laryngological methods of examination and treatment.

It may appear a rash undertaking for me to deviate from time-honored tradition, and to open up an entirely new way for the examination and treatment of the larynx and the trachea, by teaching that we can view the interior of the air-passages directly, without the aid of optical appliances, and operate with straight (uncurved) instruments in the same manner. Nevertheless, my undertaking is doubly justified. In the first place, because of the facts themselves, which may be demonstrated at any time, and which I have made known in a series of publications entitled "Autoscopy of the Air-Passages."* The fact that we have, up to this time, never viewed the interior of the larynx directly (without a mirror) is certainly not due

* Allgem. med. Centralzeitung, 1895, No. 34; Berl. klin. Wochenschrift, 1895, No. 22; Archiv f. Laryngologie und Rhinologie, Bd. ii, 1, 2; Therapeut. Monatshefte, July, 1895; Deutsche med. Wochenschrift, 1895, No. 38.

to logical reasoning, but because we had no idea of such a possibility. Since, however, we have discovered that it can be done, and how we can do it, there can be no possible objection raised to our making full use of our new knowledge and ability. In the second place, this method is not intended to replace the laryngoscopic method, but to add to it. I must decidedly deny any prejudice on my part toward the laryngoscopic method; the very fact that I myself have shown that my direct method cannot render the indirect method superfluous throws into strong light the value of the laryngeal mirror. Of course, many a laryngologist is convinced that the laryngological technique needs no additions; others may think differently. Only the future can decide this question.

KIRSTEIN.

BERLIN, January, 1896.

All the instruments described in this monograph are manufactured by W. A. Hirschmann, Berlin, N. They may also be procured from

Messrs. Krohne & Sesemann, Duke Street, 8 Manchester Square, London, W.

Mayer & Meltzer, 71 Great Portland Street, London, W.

Ottomar Carliczek, 56 Dearborn Street, Chicago, Ill.

Max Wocher & Son, 23 W. Sixth Street, Cincinnati, O.

Denyer Brothers, 272 Swanston Street (next Lonsdale Street), Melbourne, Australia.

PREFACE OF THE TRANSLATOR.

This translation, made at the request of the author, is in reality a second edition of the original German monograph. Dr. Kirstein has placed so much new material at my disposal, changing and adding to the original work to such an extent that alterations will be noticeable on almost every page. A number of illustrations are entirely new; others have been improved. Several additions have become necessary from time to time, as the translation progressed, in accordance with the improvements and modifications which were gradually developed by the author. While the translation was going through the press the author published some very important modifications of his method, simplifying the technique and the instrumentarium to a considerable degree. I have appended an abstract of his article (page 63), bringing thus the description of this method up to date.

It is needless to say that I consider the

autoscopic examination of the air-passages, as developed by Kirstein, the most important addition to our technical resources made since the discovery of the laryngoscope by Garcia. And I have no doubt that henceforth every one, who wishes to master the technique of laryngology, will have to familiarize himself with this — after all, astonishingly simple — method of laying the air-passages open to direct inspection.

M. Thorner.

Cincinnati, O., December, 1896.

CONTENTS.

AUTOSCOPY.

DEFINITION AND THEORY.

By "autoscopy of the air-passages" I understand the direct linear inspection, through the mouth, of the lower pharynx, the larynx, the trachea, and the entrances into the primary bronchi.

The necessary conditions of such a complete linear inspection can be stated *a priori* to be:—

1. The body must be placed in such a position that an imaginary continuation of the laryngo-tracheal tube would fall within the opening of the mouth.

2. This imaginary straight line must be cleared of those parts of the body (epiglottis and base of the tongue) which obstruct it.

Regarding No. 1. When the military position is assumed the continuation of the windpipe would strike somewhere in the neighborhood of the root of the nose; when the head is

bent comfortably backward, as in looking aloft, it would about strike the chin; this can be made clear by looking at any person in the erect position, if we remember that the trachea, the upper end of which in the neck lies quite to the front, runs downward and backward through the thorax, parallel to the spinal column, forming a considerable angle with the sternum. The position adapted for "autoscopy" must therefore be somewhere between the two positions just mentioned, and can be easily obtained by gently tilting the head upward until the axis of vision forms with the axis of the trunk an angle of about 135 degrees. This theoretical consideration is fully borne out by experience. (Fig. 1.) This tilting movement of the head is a rotation on the atlanto-occipital articulation. I do not believe that the flexibility of the cervical spinal column is to any extent called into requisition. The fact that a small angle in the atlanto-occipital joint will produce a sufficiently large excursion of the superior maxilla is explained by the large radius of the circle of rotation, about 12 centimetres.

Regarding No. 2. The base of the tongue can, of course, be got out of the way of the prolonged trachea in but one direction,—namely,

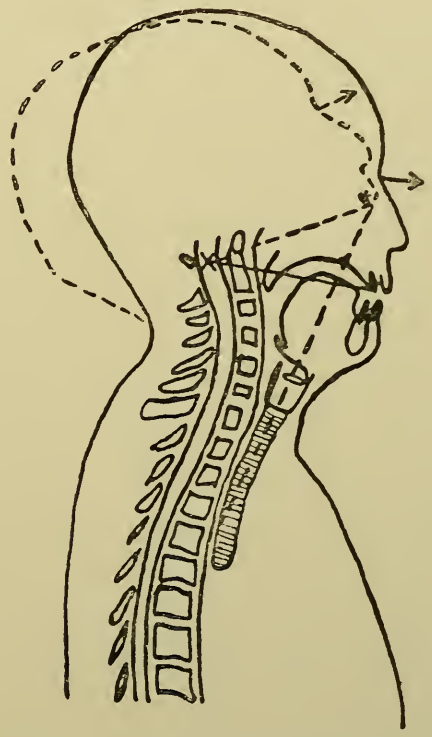


FIG. I.—POSITION FOR AUTOSCOPY.

× = atlanto-occipital articulation. —> = axis of vision.

forward and downward. To get this position of the tongue a tongue-depressor is necessary, —*i.e.*, a spatula,—which, however, unlike the ordinary spatula, must not be placed in front of

the circumvallate papillæ, but must be applied behind the same, to the root of the tongue. The epiglottis can be elevated, as has been long known, in one of two ways: (1) directly, by an instrument which projects over the epiglottis (thus, in our case, most easily by the spatula itself, the tip of which must therefore be introduced behind the epiglottis); (2) indirectly, by a method the principle of which was described by Reichert* in 1879 as follows: Pressure upon the base of the tongue and the median glosso-epiglottic ligament produces an elevation of the epiglottis on account of its close attachment to the tongue. As the first method requires previous cocainization, it should be reserved for exceptional cases; autoscopy must depend, in general, on the principle enunciated by Reichert,—a principle which is already involved in the necessary instrumental depression of the base of the tongue.

The patient tilts his head slightly upward and opens his mouth; the physician presses the base of the patient's tongue forward with a spatula.

* "Eine neue Methode zur Aufrichtung des Kehldeckels bei laryngoscopischen Operationen," Arch. f. klin. Chirurgie, Bd. xxiv.

These are the remarkably simple directions which we deduct from our theoretical considerations concerning the possibility of autoscopy. Looking at the question from the stand-point of our present knowledge, it is hard to see how a discovery lying so near at hand should have been so long overlooked. One would imagine that an off-hand glance at any sagittal section of the upper part of the body would have sufficed to suggest the idea of autoscopy. The *stimulus* to such a discovery, however, was apparently wanting, because the need of additions to our laryngological armamentarium was nowhere felt. Whoever would conclude from this that autoscopy even now, after it has become established, fills no real need, might have argued with the same logic that the laryngeal mirror is superfluous because through all the preceding centuries there was no demand for it until, forty years ago, it was discovered by a musician, and then had to be forced upon a profession—whose duty it was to recognize and treat disease—not by a practising physician, but by a physiologist.

It seems to me even more remarkable that

chance, which has so often led to discoveries, has left laryngology so completely in the lurch in this particular. At present, during an ordinary examination of the pharynx, in depressing the tongue with the usual angular spatula, we occasionally get, all of a sudden, a full view of the whole arytenoid cartilages and part of the vocal cords, sometimes even of the bifurcation; formerly this never occurred. I can only explain this fact by supposing that the diligent use of the autoscope leads, in depressing the tongue, to a special dexterity which formerly was scarcely called for. By practising autoscopy we acquire an entirely new way of introducing the spatula. Our preconceptions regarding the awful reflex excitability of the base of the tongue we soon relinquish; we lose our timidity; we place the patient in a better position; we no longer look mainly in an horizontal direction, but also now from above downward. Those laryngologists who are accustomed to make examinations while standing were much more likely to make the accidental discovery of direct laryngoscopy than the majority who use the laryngoscope

while seated. Time will show that autoscopy will introduce into laryngological technique a certain freedom of action which is of great advantage, provided it is not overdone.

THE TECHNIQUE.

I. ILLUMINATION.

STATIONARY appliances of illumination ("*Stativspiegel*") are of no value, not only for autoscopy proper, but also for the freer method of laryngoscopy which has lately come into vogue. The cone of light reflected into the throat must come from a source attached to the observer himself, so that it can readily follow his slightest movements, and thus render him independent of the position of the reflector. The forehead-mirror answers these requirements essentially, though not quite completely. At all events, it is the only favorable and thoroughly practical instrument for autoscopy, if we use sunlight, or have to depend upon lamplight, Argand burners, or the incandescent gaslight,—the so-called Wellsbach light. Only the *electric light* renders us entirely independent, or, rather, *can* render us entirely independent, if we avail ourselves of its possibilities. If we simply substitute an incandescent

lamp (with or without a condenser) for the gas-light, and use a forehead-mirror according to our old custom, we thereby sacrifice, for the sake of a traditional method based upon entirely different conditions, the special advantages of the electric light. Two persons are necessary for an examination of the throat: a patient and a physician. The classical method of examination requires the addition of an entirely superfluous and troublesome element,—namely, the lamp. This is stationary, and may not be disturbed; the observer must regulate, according to its position, the position of his own head, which bears the forehead-mirror; and which should be moved with no other considerations than the position of *the patient.* Furthermore, the lamp must be shifted when the patient bends, and must be raised when the patient is examined according to Killian's method; and last, but not least, the physician, instead of simply giving light, is himself constantly illuminated and blinded. At all events, this is at least endurable, and without the electric light there is no other way. But we need not make a virtue of our necessity. We may at least

admit that all this is disagreeable and an impediment, although custom has blunted us to this fact.

The electric light resembles sunlight more than the Wellsbach light does, but the latter resembles sunlight sufficiently for all practical purposes of laryngology. The pre-eminent value of the incandescent lamp depends, in my opinion, on something else,—namely, the fact that it is free from limitations as to place and position. The incandescent lamp weighs practically nothing; it can be placed obliquely or upside down; the observer may have the best light without a lamp, as it were, for he attaches the lamp simply to his own forehead and need pay no further attention to it. Students must acquire the use of the forehead-mirror; and, even could electric light be placed at their disposal, the forehead-mirror would nevertheless be in place, in my opinion. When, however, it is not a question of acquiring, but of practising laryngoscopy, the *forehead-lamp* is the rational instrument for electrical illumination. The conducting-cords, which are needed to connect the forehead-lamp with the battery,

are certainly not a pleasant addition, and require a certain familiarity. But the connecting and disconnecting with the battery is but little trouble, and quite separate from the examination itself. It differs, therefore, decidedly from those other inconveniences which we have noted; the long cords do not in any way interfere with our movement; the forehead-lamp leaves us entirely *unimpeded* as observers and as operators.

A simple forehead-lamp which gives direct, unreflected light meets all requirements as long as we do not wish to examine the deeper portions of comparatively narrow cavities; but it is not well adapted to autoscopy or to anterior rhinoscopy, because in these cases the axis of our vision cannot coincide with the axis of the rays of light; so that either the one or the other falls obliquely upon the parts to be illuminated, and thus a clear view of the deep portions is impossible.

All the demands of laryngological and rhinological technique, inclusive of autoscopy, are met by a *forehead-lamp for reflected light* invented by me (Fig. 2), in which the rays of the

electric light, after they have been collected by a convex lens, are deflected at a right angle, immediately on issuing from the lens, by a small plain mirror (*S*) placed at an angle of 45 degrees to it. The mirror is perforated obliquely through its centre for the eye of the observer. The latter need pay no attention to

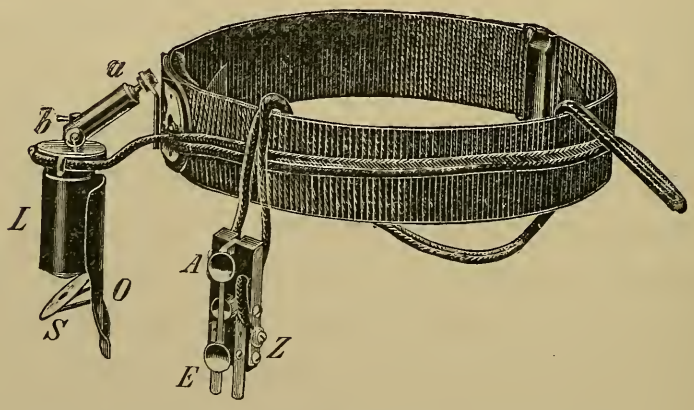


FIG. 2.—FOREHEAD-LAMP FOR REFLECTED LIGHT.

the angle at which the mirror is placed, but is guided solely by a longitudinal disc of tin (*O*) placed vertically behind the mirror (between it and the eye), and which is also perforated. When one can look through both perforations, the axis of vision coincides, of necessity, with the centre of the bundle of light-rays,—an ideal

condition for the purposes of vision. The lamp (*L*) is attached to the head-band by means of two joints (*b* and *a*) in such a way that any desired motion within the widest possible limits can be carried out with the least amount of force, and so that the lamp remains fixed in any given position. The lamp is moved from one position to another by grasping the lower border of the perforated tin disc. This latter serves also to protect the observer from the heat of the lamp. A current interrupter (*A E*) is attached to the cord.

For the special purposes of autoscopy, in addition to the forehead-lamp, another electrical appliance for illumination must be considered, —one which, I think, will gain the favor of laryngologists. This is the so-called *electroscope*, —an excellent instrument originally devised by Casper for examining the urethra, and which has been unessentially modified by me for the purposes of autoscopy. It (Fig. 3, page 16) consists of an electrical hand-lamp, the rays of which are collected by a lens and deflected 90 degrees by a prism. This hand-lamp is used as a handle; to it the spatula (*S*) of the autoscope

is fastened at a right angle by means of a set-screw (*a*), so that the rays of the light are reflected along the spatula,—an ideal optical condition which can thus not be disturbed. Therefore, we need be at no special pains to direct the light; we have simply to direct the spatula, and the light must follow of itself. Verily, a more convenient method of examination cannot be thought of. The observer looks immediately above the edge of the prism, so that he can get a complete view of the field brilliantly illuminated by the diverging rays of light. Autoscopy can hardly be *demonstrated to others* without the use of this electroscope.

THE TECHNIQUE.

II. THE AUTOSCOPE.

The autoscope consists of three parts: a spatula, a hood, and a handle. When the spatula (*S*, Fig. 3) is pressed upon the posterior part of the tongue the middle of the tongue is depressed more than the more fixed, lateral portions, so that a groove is formed between the palato-glossal arches; it follows, therefore, that the spatula, as used in autoscopy, should have the shape of a groove. The narrower the groove, the less it infringes upon the lateral, more fixed portions of the tongue, and the more deeply therefore can it be pressed into the middle portion of the tongue. The spatula may not be too narrow, however, because the tongue would at times rise up on both sides of it, and thus shut out the light. As not only the tongue, but also the superior maxilla, must be kept out of the way of the straight line of vision, the spatula for autoscopy must form a straight line from before backward; only at

the end, where it has already passed the convexity of the tongue, the ordinary (prelaryngeal) spatula is given a downward curve, so that it can elevate the epiglottis by exercising

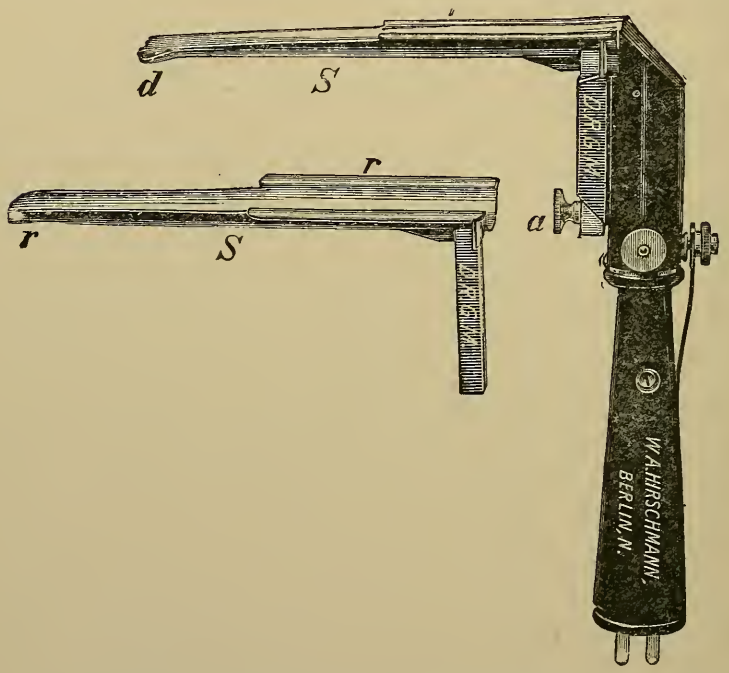


FIG. 3.—STANDARD SPATULA (*S*) ATTACHED TO THE ELECTROSCOPE, AND INTRA-LARYNGEAL SPATULA (*S'*), BOTH WITH HOODS OMITTED.

the proper pressure upon the base of the tongue (and thus also upon the body of the hyoid bone, which can always be easily felt in the valleculæ) and upon the median glosso-epiglottidean ligament. The tip (*d*, Fig. 3) of the spatula, which

must be thickened and well rounded, in order to avoid injury to the mucous membranes, must also be notched to receive this latter ligament. The spatula for adults is 14 centimetres long; at the tip it is about 2 centimetres wide, and it is about 1½ centimetres wide where it passes the convexity of the tongue. It is made of nickel-plated German silver, is exceedingly easy to clean, and can be readily sterilized in boiling water. The tip of the ordinarily used *standard spatula* is bent downward so that its free border is 1 centimetre below the level of the bottom of the grooved portion. Yet, it is desirable to have two spatulas in addition,—one with a larger curve, but especially one with a smaller curve, to be used in special cases, as experience will soon indicate.

In cocainized patients, especially for operative purposes, the intra-laryngeal spatula can be used. This is introduced *behind* the epiglottis, presses it against the root of the tongue, and thus hides it from view. This intra-laryngeal spatula (see *S'*, Fig. 3) forms a perfectly straight groove, which ends anteriorly in a thin, convex border. It is by no means always easy

to introduce this spatula, as soft and very yielding epiglottides readily escape its grasp. If occasion demand, one might try to introduce the prelaryngeal spatula with the slight curve behind the cocainized epiglottis. All the different forms of spatulas have lateral ribs (*r*), to which the hoods are attached.

The hood, which is 6 centimetres long and 3 centimetres wide, is also made of nickel-plated metal. It serves to keep the passage clear for light and vision, which would otherwise be obstructed by the close contact of the upper teeth, or by the upper lip, and possibly the moustache. By withdrawing the hood a little it is possible to lengthen the autoscope in examining very large people; in the same way the nose of the patient can be protected from contact with the electroscope, the upper end of which sometimes becomes heated. In certain cases the hood may be dispensed with. I have had hoods made of three different heights,—about 3, 6, and 9 millimetres; the medium-sized ("*standard hood*") is the one most commonly used; the largest-sized allows the introduction of large instruments (forceps,

etc.) for operative purposes; the small-sized one is also occasionally useful. It is astonishing through what a narrow slit we can get an unhindered view in autoscopy; a slit 3 millimetres high is amply sufficient, though usually we grant ourselves a greater allowance.

Instruments of unusual thickness cannot be

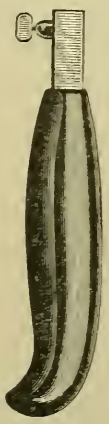


FIG. 4.—PLAIN HANDLE.

introduced even through the largest hoods if we employ the electroscope, which certainly is very convenient as an illuminating handle, but which covers up, with its prism, the entrance into the grooves, and leaves free only the passage-way through the hood. Much space can be gained (though this is very seldom necessary) by at-

taching the spatula to a *simple* metallic *handle* (Fig. 4) which is used in connection with the forehead-lamp (or the forehead-mirror).

I have of late,* however, succeeded in dispensing with the hood by substituting a simple plate for it (*P*, Fig. 5), which is fastened, on

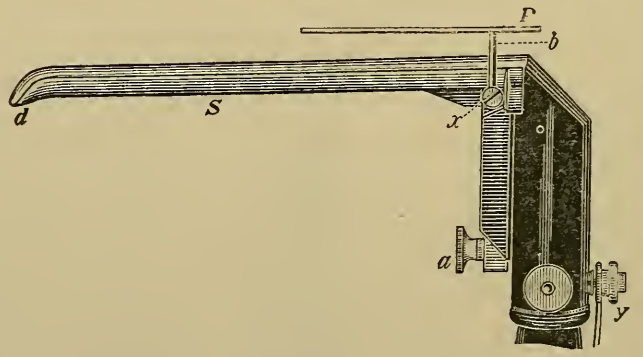


FIG. 5.—AUTOSCOPE WITH PLATE (*P*) INSTEAD OF HOOD.

its left side, to the spatula by means of a metallic bar (*b*) and a set-screw (*x*); consequently, the lateral ribs of the autoscopic spatula (*S*) are omitted and the autoscope is entirely open on both sides. By this means the introduction of surgical instruments is greatly facilitated.

---

* March, 1896.

THE TECHNIQUE.

III. AUTOSCOPY.

AUTOSCOPY is an *art*, to begin with. Whoever believes that simply by reading this book and by procuring an autoscope he will be able to use it successfully is sadly mistaken. Autoscopy is a *difficult* art, until one has acquired a certain, hard-to-define knack in introducing the spatula. He who has once mastered the use of the autoscope will seldom meet special difficulties which he cannot easily overcome.

We have seen, in the chapter devoted to the theory, that the axis of vision of the patient should in general form a more obtuse angle with the trunk than it does in military position. If the patient who is sitting perfectly straight should bend his head somewhat backward, the continuation of his trachea, though somewhat inclined toward the vertical, would project so steeply upward that the examination would become inconvenient for the physician. We therefore tell the patient to bend the whole

upper part of his body slightly forward, as illustrated in Figs. 6 and 9 (page 49). This forward inclination of the body has the further advantage that the muscles of the neck thereby

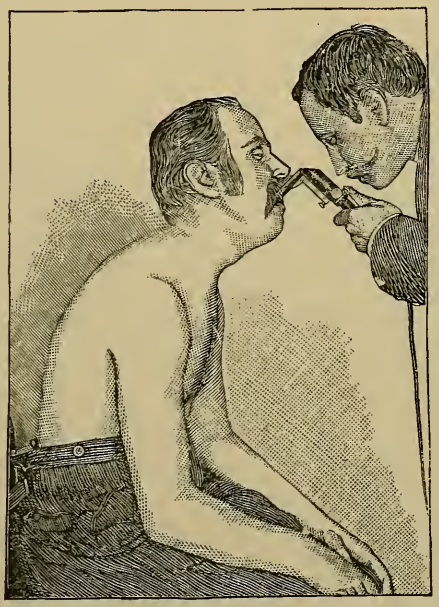


FIG. 6.—POSITION FOR AUTOSCOPY.

This photograph was taken from a partly stripped patient in order to show distinctly the position of head and neck during examination.

become somewhat relaxed, of which fact one can easily convince one's self by palpating the sterno-cleido-mastoid muscles.

For the purpose of examination the patient need not undress, but might remove his necker-

chief or a very tight collar. False teeth should be removed. The physician stands in front of the patient, who is seated. The autoscope is grasped with the whole hand—it is best to practise from the beginning with the left hand—and is introduced *well illuminated,—under no circumstances without the guidance of the eye.* If the electroscope is used,—which will probably be the rule,—the electric contact is closed for the purpose of illumination before the introduction of the instrument. The spatula is introduced in such a manner that its tip catches in the groove between the tongue and the epiglottis. (The beginner is liable to rest the spatula on the tongue, or he may inadvertently hook it behind the epiglottis!) The handle is now raised until the hood touches the upper incisors, care being taken not to include the upper lip between the hood and the teeth (avoiding this, if necessary, with the other hand), and the base of the tongue drawn evenly and steadily downward and forward as far as possible without exercising any force. During all this time the physician looks through the hood, using his better eye, and, if possible,

without glasses. The autoscope may come in contact with the upper teeth, but must never exert painful pressure against them.

If the autoscope is properly introduced, the physician may take his time and examine at his leisure, while the patient breathes and phonates quite at his ease. In withdrawing the instrument care must naturally be taken to raise the hook-like tip by lowering the handle of the instrument, thereby avoiding the danger of pulling the tongue forward. Should the patient attempt to grasp the instrument, it must be instantly removed.

The proper manipulation of the autoscope requires, as already stated, a *great deal of practice;* only those will succeed in completely mastering this method who, from the beginning, lay the blame for all their failures in the introduction of the instrument *upon themselves.* The expert autoscopist can be known by two characteristics: he *very seldom* excites *reflex movements* (retching) in the patient, and *very rarely pain.* To attain this end the physician must work accurately and rapidly, but not brusquely; he must be careful, considerate, and must have

a gentle and skillful touch. One should always bear the following maxim in mind: "The autoscope is an instrument in using which the physician can hurt *every* patient, but should hurt *none*." It is true that most patients, even in the hands of the most expert autoscopists, will suffer some inconvenience from the first examination. But this sensation is not painful; it depends primarily upon the fact that the base of the tongue is subjected to contact with a hard, smooth, and cold instrument,—something to which it is not accustomed, and which is opposed to its natural functions. If the physician has self-assurance and tact, he can easily reconcile the patient to manipulations which are not altogether agreeable; some physicians succeed better than others in allaying the fears of timid patients, and in preparing them for examination. Individuality plays a large rôle in such matters. Certainly the method should not be blamed for what is due to unskillful manipulation. As a rule, the method is painless and easily borne. It stands to reason that certain persons with exaggerated sensitiveness to pain may be an exception to the rule, and

may suffer real pain from even gentle pressure. Comparing the two methods of examination, laryngoscopy is, on the whole, the more elegant and gentle method, though there are not a few patients who prefer the autoscope to the mirror. In the worst cases the mucous membranes may be anæsthetized with cocaine.

Certain little knacks—such as changing the position of the patient, holding the autoscope obliquely, or even looking past it, which are sometimes of advantage—can be picked up by everybody as occasion demands.

Autoscopy occasions the physician certain annoyances and inconveniences, which may be summed up as follows:—

1. The expense of the armamentarium and the trouble of acquiring the technique.

2. The dependence on an available and reliable source of electricity (storage battery or connection with the street-current). Autoscopy can, of course, as stated before, be carried on by means of any sort of illumination, but the electric light is best adapted for freely realizing all the advantages of this method.

3. The physician is closer to the breath of the patient, and glasses become thus more easily clouded, and he is also more exposed to any violent coughing spells of the patient, provided he is not careful; but the disturbance caused by the coughing against the laryngeal mirror is thereby avoided. There is, however, a simple remedy for the clouding of spectacles by the breath of the patient. The physician puts on a forehead-mirror (intended, in this case, only as a protecting diaphragm) and looks through its central perforation; by this means the moisture exhaled by the patient against the eye of the physician is almost entirely condensed upon the forehead-mirror, thus leaving the spectacles clear.

I am acquainted with no other disadvantages of the autoscopic method to the physician. That there may be certain disadvantages, however, to the patient, arising from autoscopy, cannot be denied,—if the instrument is poor or if the physician is a bungler; but under no other conditions. On the other hand, the act of autoscopy may occasionally exert a certain therapeutic effect (be it by pressure on the

base of the tongue or through suggestion), in certain forms of paræsthesia, neuralgia, or hysteria; so that a few patients even demand the application of the autoscope again and again.

The only contra-indication to autoscopy will be mentioned hereafter.

INDIVIDUAL FITNESS FOR THE AUTOSCOPIC EXAMINATION.

As is well known, the examination of the air-passages by means of the laryngeal mirror is possible, in the great majority of cases, to a rather uniform degree. *The autoscope, on the other hand, gives us, in some instances, a perfect picture of the larynx and of the trachea; in others, an incomplete picture; while in still others no view at all is obtainable.* The causes of these individual differences may be stated as follows: A projection of the anterior wall of the tracheo-laryngeal tube forms a tangential plane (Fig. 7, p. 30), from which we must remove the upper jaw backward and the tongue (with the epiglottis) forward in order to obtain a complete autoscopic view. The former can be accomplished easily, as we know, in all people by a slight tilting backward of the head (a physiological rotation on the atlanto-occipital articulation). An explanation of the difference must therefore be sought in the second factor,—namely, in the

possibility of depressing the tongue. While the tongue is being depressed by the illuminating autoscope, the light, like a radius vector, at first sweeps over the posterior wall of the pharynx from above downward, then passes over

FIG. 7.—TANGENTIAL PLANE.

the arytenoid cartilages, and lights up successively the air-passages from behind forward till it reaches the anterior angle of the glottis. During this procedure the spatula of the autoscope overcomes the elastic resistance of the

tongue, using successively two fulcrums,—the first a dorsal one (*i.e.*, the root of the tongue, between the palato-glossal arches) and the second a basal one (*i.e.*, the hyoid bone itself or immediately above it). A thorough and unhindered use of the autoscope depends, therefore, mainly upon the thickness and consistency of the tongue and the resistance of its lateral attachments, and secondarily upon the mobility of the hyoid bone. Furthermore, it is evident that the possibility of pressing the tongue forward and downward must be taken more or less advantage of, according to the varying forms of the head and neck. Let us imagine the patient in a position adapted to autoscopy, the tongue at rest, just before pressure is made upon it (Fig. 8, p. 32). Let us now join with straight lines the point on the back of the tongue where the pressure is made (*Z*), the middle of the free border of the upper jaw (*O*), and the anterior commissure of the vocal cords (*C*). The form and size of the triangle *Z O C* will thus become the index of the amount of dislocation to which the tongue must be subjected to render autoscopy possible in a given indi-

vidual. For a perfect autoscopic examination (A) the radius vector must be carried forward through the angle $Z\ O\ C$ ($\triangle$); if the condition of the patient's tongue allow a movement only through a smaller angle (δ), then $A = \frac{\delta}{\triangle}$

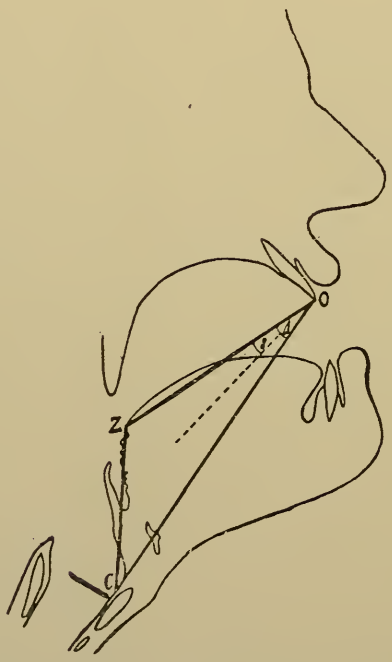


FIG. 8.—DISPLACEMENT OF TONGUE IN AUTOSCOPY.

Fitness for autoscopic examination varies, therefore, with each individual. To determine this empirically requires a willing assistance on the part of the patient, which can easily be ob-

tained in the vast majority of cases. This fitness would appear less than it really is should the patient retch or put his muscles on the stretch through anxiety. Should he be able to relax his muscles the examination may, nevertheless, be rendered difficult at times by a rigid epiglottis, or one with too large a curve, or one which is so loosely attached to the tongue that it cannot be sufficiently raised, and thus blocks the view into the laryngo-tracheal tube, which would otherwise be in the direct line of vision. Such cases are more adapted to the intra-laryngeal autoscopic spatula, which requires the use of cocaine, and which should, therefore, be restricted to special indications only.

In examining a patient with the autoscope we accomplish two things: (1) we determine his special fitness for the examination with the autoscope, and (2) we learn the condition of the parts open to inspection; both results are achieved by one and the same act. According to my estimate, in about one-fourth of all adults the whole larynx and the whole trachea can be conveniently examined autoscopically ($\delta = \triangle$), with this limitation: that the extreme apex of

the anterior commissure cannot be seen nearly so often (possibly in about one-tenth of all cases). About one-half of all people can be fairly well examined with the autoscope, so that the posterior region of the larynx, including sometimes a more or less extensive portion of the trachea, is exposed to view. The remaining cases include those in whom one cannot see beyond the tips of the arytenoid cartilages, or not even so far, and those who, owing to their abnormal irritability, cannot be examined at all without cocaine. By pressure applied with the thumb upon the middle of the thyroid cartilage the autoscopic field of vision toward the front can be considerably enlarged in many, especially in the young. By means of this manipulation—which may in operations be left to an assistant—the anterior commissure can be brought into view rather frequently. Most patients stand this manipulation well. Men and women, so far as I have been able to see, are equally adapted to autoscopic examination.

Should any one wish to make a statistical investigation of these statements, let him not begin to count until he has fully mastered the entire technique of autoscopic examination.

COMPARISON BETWEEN AUTOSCOPY AND LARYNGOSCOPY.

After having recognized and demonstrated the possibility of examining the mucous membrane of the larynx and the trachea autoscopically; after having developed and tested a thousandfold a simple and uncomplicated technique; after having determined the limits of its usefulness, and having completed the requisite diagnostic and therapeutic armamentarium; after having, furthermore, performed autoscopic operations in all parts of the larynx, even up to the anterior commissure, I feel that all of these experiences are sufficient to justify me in trying to specify the position which autoscopy may occupy among the methods of laryngological examination and therapy, and in comparing it with laryngoscopy.

I. EXAMINATION OF ADULTS.

It is the investigator who is responsible for the discovery and the correct estimation of

facts; the physician is responsible for the most useful and skillful application of these facts; but no one is responsible for the facts themselves. It cannot be laid to our door that the throats of many people are so formed by nature that we cannot get a good view of their deeper portions. Just as little can it be placed to our credit that the necks of many other people are shaped differently, and allow us to see directly down to the sixth ring of a bronchus without difficulty. If we add to our art a new method by the aid of which we can see and touch without the use of a mirror the trachea of one person, we ought certainly not to be blamed if this method is not applicable to every other person. It is simply our duty to draw the logical conclusions from such actual objective experiences which we have recorded in our studies. The first of these conclusions is this: We *must continue using the laryngoscopic mirror* now as formerly. This truth is easily established.

In our consideration of the individual fitness for autoscopic examination we saw that the mirror could be dispensed with in only a

certain number of cases, as regards the examination of the larynx and the trachea. If we bear in mind that the root of the tongue (behind the papillæ circumvallatæ) can ordinarily be seen *only* by means of the mirror (the autoscope covers this portion), it is clear that the *laryngoscopic mirror can be hardly ever wholly dispensed with* for a *complete* examination of the throat. The only contra-indication to the use of the autoscope is a morbid condition of the base of the tongue or of the valleculæ,—a condition which is rarely encountered; this can be recognized only by means of the laryngoscopic mirror. It would therefore be proper, under ordinary circumstances, to examine the throat first with the laryngoscope, and not till then with the autoscope; but not much importance need be attached to this order of procedure.

My statement—"We must continue using the laryngoscopic mirror now as formerly"—might lead some one to say: I acknowledge that the discovery of the autoscope has enriched our theoretical knowledge; I admit also that in certain rare cases autoscopy may have some special value; on the whole, however, I

consider this innovation as useless for practical purposes, for we continue using the laryngoscope, and things are as they were before. But this would be an error. We continue using the mirror, now as before, but things are *nevertheless not* what they were before; on the contrary, a good many things will be changed, although this may not take place at once, nor everywhere. Everybody certainly has the privilege of refusing to become acquainted with autoscopy; but whoever has once grown accustomed to its use will soon no longer be willing to do without it. The weakness of autoscopy lies in the limitation of its applicability, as just explained; but *within* the field of its applicability it is, in *almost every respect*, *superior* to laryngoscopy. In comparing the two methods we must, once for all, bear in mind, in speaking of autoscopy, the phrase, "within the limits of its applicability in the given individual."

Under ordinary circumstances the vocal cords are seen at a shorter range with the autoscope than with the mirror; and, furthermore, with my method the object *itself* is seen with undiminished distinctness, with all its natural

colors and shades of light; with the method of Garcia, Türck, and Czermak, however, only the reflected image of the object is seen,—an *excellent substitute*, but at best only a *substitute* of direct vision. It is a matter of no practical importance that the mirror permits of binocular vision, while autoscopy allows of only monocular vision (just like anterior rhinoscopy). Every anatomical detail (such as slight irregularities of the surface, small erosions, etc.) can be recognized and appreciated far better with the autoscope. It is only in the diagnosis of disturbances of mobility that the laryngoscope is more appropriate, as the autoscope slightly immobilizes the larynx; in every other respect autoscopy is the better method. The autoscopic picture has all the vivid freshness and warmth of actual life; the reflected image is duller and colder, it is a beautiful art-product, and comes to us at second-hand. How often, during the past few months, have I heard the exclamation: "The larynx looks *entirely different!*"—which remark did not refer to the no-longer-present reversal of the image. Strictly interpreted, this would prove that hitherto we

have not really known how the larynx *actually* does look.

In the beginning of our experience in autoscopy it was rather painful to feel that the reflected image was so much less beautiful than the autoscopic picture, and that we, nevertheless, could not dispense with it; autoscopy thus awakens a desire which it cannot fully satisfy. Autoscopy is, therefore, a difficult morsel; until it is thoroughly absorbed into the life-blood of laryngology it will cause many a digestive disturbance.

For the purposes of scientific demonstration autoscopy is just the thing; a number of spectators can look, one after another, through the autoscope and note the conditions. In persons well adapted to autoscopy it is easy to demonstrate to any layman the movements of the vocal cord, the physiological pulsation of the wall of the trachea, the systolic beating of the bifurcation-spur, and quite as easily a carcinoma of the larynx.

The special triumph of autoscopy lies in the possibility it affords of obtaining, in many cases, an incomparably complete view of the

posterior wall of the larynx and the entire inner surface of the *trachea*, as well as of the entrance of the bronchi. There is no special need of discussing these important points in detail. Whoever has once obtained a good autoscopic view of these parts requires no verbal explanation of the advantages it offers to the eye, and mere words can give no adequate idea to him who has never seen it. I therefore refer the reader to the testimony of his own eyes, and limit myself here to the expression of my conviction, corroborated by extensive experience, that autoscopy has considerably advanced our ability to diagnosticate, and especially to treat, pathological conditions of the posterior laryngeal wall, the trachea, and the primary bronchi. Given a patient suffering from chronic tracheobronchitis, stenosis of the bronchi, or something similar, the cardinal question concerning the local treatment is: Can he be readily examined with the autoscope or not? In *principle* and in *theory* we can see and accomplish nothing by means of the autoscope that we cannot do as well by means of the laryngoscope; but the difference in our practical results is, neverthe-

less, very great. The posterior wall of the larynx, as is well known, forms in different people a varying angle with the longitudinal axis of the trachea; according to this variation the angle at which it appears in the autoscope also varies. The nearer it approaches to a right angle, the better is the view obtained; a perfect surface-view can be obtained, in many cases, only when the patient departs from the normal position and lowers his head toward his breast. I think that I am able to get a sufficiently good autoscopic view of the posterior wall of the larynx in about two-thirds of all cases.

In practice it is certainly not necessary to exhaust all of our means in every case, and thus we need not use the autoscope in every patient; but experience will soon teach any unbiased observer that autoscopy is necessary to a *complete* and *thorough* examination of the throat in many cases. The more familiar we become with the autoscope, the more we shall learn to regret that the possibility of being examined thoroughly and satisfactorily with this instrument is not a universal characteristic of the human race.

There is no theoretical objection to the employment of *magnifying instruments* in autoscopy, to the use of *Oertel's stroboscope* (strobautoscopy of the larynx).

I can also recommend to such of my colleagues as have experience in photography to try to photograph the larynx through the autoscope.

In this connection I may mention a procedure not strictly autoscopic, but made possible by means of autoscopy, which consists in the inspection of the under surface of the vocal cords by means of a small, round mirror 8 millimetres in diameter; this mirror is introduced, through the autoscope, beneath the glottis of the cocainized patient. The subglottic mirror is fastened to a very thin, nickel-plated rod of copper, which may be bent to suit the requirements of the case. Hitherto the view of the under surface of the vocal cords (first obtained, as far as I know, by Rauchfuss) could be gained only as a twice-reflected image, for the lower image had to be reflected once more by a mirror higher up; thus the picture was, so to speak, "third-hand"!

COMPARISON BETWEEN AUTOSCOPY AND LARYNGOSCOPY.

II. EXAMINATION OF CHILDREN.

CHILDREN are examined with the autoscope in the same manner as adults, but the spatulas used are shorter (12 centimetres) and narrower. Though the shape of the epiglottis in children is not well adapted to laryngoscopy, it does not offer so great an obstacle to autoscopy, in which the epiglottis is raised. The success of autoscopy in children depends more or less upon circumstances. Obstreperous children, who will not allow any manipulation, can be made to submit to the examination by force. It is obvious that this is a *dangerous* procedure in inexperienced hands. I do not at all recommend it, but simply wish to state that it can easily be done. In struggling children the entrance to the larynx appears contracted; the epiglottis, the arytenoid cartilages, and the ary-epiglottic folds are readily seen, and this is often sufficient for a diagnosis in children.

I have frequently made autoscopic examinations of children under the influence of an anæsthetic; this was accomplished with the greatest ease and to the fullest extent; in fact, I have come to the opinion that the equation $\frac{\delta}{\triangle}$ is comparatively favorable in children. The head of the chloroformed child is drawn over the edge of the table and is held by an assistant. The autoscope is now introduced with the left hand, the spatula directed downward, and the base of the tongue is then pressed forward in the usual manner with the spatula; the head of the child is now gradually raised or lowered until the correct position is obtained. In this attitude a bougie can be pushed readily into the larynx, or intubation may be performed under favorable circumstances. Should one desire to use the intra-laryngeal spatula, cocaine could probably not be dispensed with, even though chloroform were employed. I would be loath, however, to use cocaine during anæsthesia, not so much from fear of intoxication, but on account of the danger of aspiration when the entrance of the larynx is completely anæsthetized.

In all probability autoscopy will assume an important rôle in the examination of children, —*on an equal footing* with laryngoscopy; but in *preference to* laryngoscopy in very young children. Even infants can be examined with the autoscope; they are most easily examined in the dorsal position, as just described, naturally, without the use of an anæsthetic.

COMPARISON BETWEEN AUTOSCOPY AND LARYNGOSCOPY.

III. OPERATIONS.

We now come to the consideration of autoscopy in its relations to the technique of local treatment. It is immaterial whether we carry out such common procedures as injections, insufflations, applications with the brush, etc., according to the old or the new plan, in patients well adapted to autoscopy. I will therefore confine myself to the consideration of operative procedures. *Autoscopy is veritably a surgical method;* it exposes the larynx in the depth of the throat with a speculum, in about the same way as the portio vaginalis uteri is exposed by the distension of the vagina. When I have once brought a tumor to view through the autoscope, I simply have to attack it straightway with forceps, knife, or snare, in whatever manner is most suitable. For this purpose I control the autoscope with my left hand and introduce the instrument with my right hand between the

hood and the spatula, along its right side. The handle of the surgical instrument can be held, according to the requirements of the case, parallel with the handle of the autoscope or at any desired angle to it. There is no room in the autoscope for extensive lateral movements of the surgical instrument; but this is no loss, for we can seize nothing that we do not distinctly see, and we can see only that distinctly which is brought well into view through the autoscope. With our left hand we must closely control the position of the autoscope; our right hand remains free for the more delicate manipulations. (Fig. 9.)

The instruments for autoscopic operations are shaped like nasal instruments; they measure 20 centimetres from the knee to the tip, and are correspondingly longer for the windpipe. We are not under the necessity of devising new instruments; we simply transform our *ordinary* into an *autoscopic* armamentarium (Fig. 10, page 50) by having our laryngoscopic models lengthened and bent, and the rhinological ones simply lengthened.

Endolaryngeal operations are comparatively

easy with the autoscope and comparatively difficult with the laryngoscope. This fact might cause dissensions among laryngologists.

FIG. 9.—AUTOSCOPIC OPERATION.

To some it will appear self-evident that we should not make a difficult operation out of an easy one, that we should not construct obstacles just for the pleasure of overcoming them, and

that we should not seek to exercise the exceptional skill of a specialist when ordinary surg-

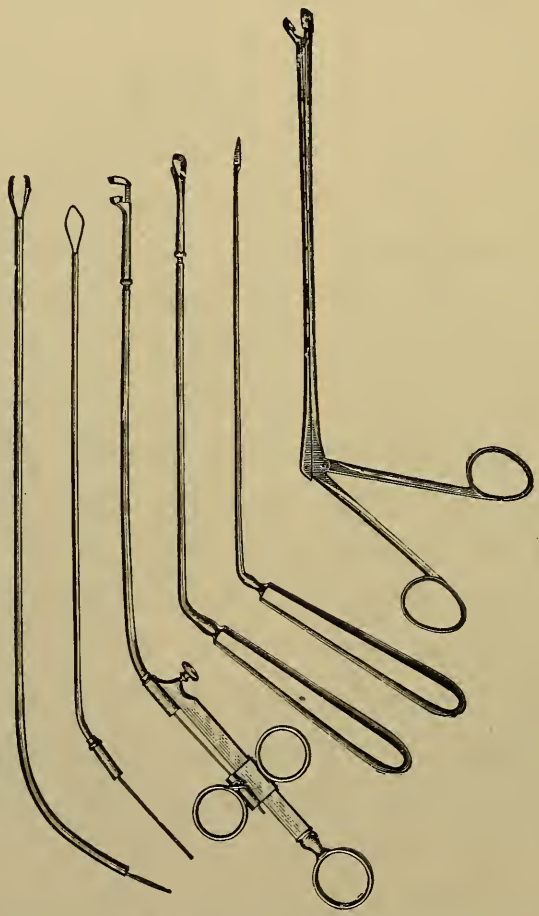


FIG. 10.—TYPES OF INSTRUMENTS FOR AUTOSCOPIC OPERATIONS.

ery is wholly adequate. On the other hand, there are teachers who will warn their pupils against spoiling themselves by practising auto-

scopy, instead of using every opportunity to operate under the guidance of the mirror; arguing that operators will have to use the laryngoscope in the future just as in the past, as there always will be many patients requiring operations who are poor subjects for autoscopy. We can imagine a laryngological parliament the radical wing of which, as a matter of principle, would operate with the aid of the laryngoscope only in those cases not adapted to autoscopy, while the conservatives would tolerate autoscopic manipulations only under exceptional circumstances; the centre, however, would decide each case on its merits. In my opinion, the question does not justify a position either on the extreme right or left. To make a battle-cry of the autoscope, on the one hand, or the laryngoscope, on the other, would be folly. Where two ways are open, some for many reasons will prefer one, while others prefer the other; we can ask no more of any operator than that he should perform any necessary operation with nicety and care. How he does it is a matter of taste. If, in spite of this, I nevertheless believe that finally, in the course

of years, autoscopy will be generally accepted —of course, not as a matter of dogma—as the *standard method for endolaryngeal and endotracheal surgery* in those cases in which it can be easily used, I base this conclusion on human nature, which does not obstinately hold on to a complicated procedure when a simple one is at its disposal. Whatever resistance arises from custom (and this I by no means undervalue) will of itself grow weaker with time, and the argument that we have got along so far without autoscopy will lose its force after awhile. Autoscopic operations on the posterior wall of the larynx will become common property of laryngologists more quickly (or, rather, less slowly) than the other autoscopic procedures.

Autoscopy comes in competition with general surgery in only one class of cases, —namely, in foreign bodies in the air-passages; here it will render tracheotomy unnecessary in some cases.

Concerning *endotracheal local therapeutics*, which can now reach a development which was denied to it in the pre-autoscopic era, I should

like to raise a finger of warning, as a result not of unfortunate experiences of my own, but of observation and reflection. The lower half of the trachea is a region of *great danger!* The rhythmical bulging of its wall, especially the tracheal *aortic pulse*, which can be easily seen toward the left and somewhat anteriorly, and readily counted, is a *constant* and impressive phenomenon in people well adapted to autoscopy, which should lead to the greatest caution in the introduction of rigid instruments. The aorta lies almost in as close contact with the wall of the windpipe as the radial artery does with the surface at the wrist (reference is made only to the aorta distended with blood, as it is during life, and not to the conditions existing after death). During the examination of a number of healthy people the aortic arch has often seemed to protrude like a hump, as it were, into the trachea; so that the beginner in autoscopy would be tempted to diagnosticate an aneurism where none exists. I have seen the most enormous pulsations in patients suffering from aortic insufficiency, in whom, however, there was no evidence of actual aneu-

rismal changes; in such cases I have seen very marked undulations over an area about 6 to 8 centimetres long and 3 centimetres wide.

CONCLUSION.

WHOEVER believes in uninterrupted progress, in small things as well as in large, may nurture the hope that in the future autoscopy will be developed to such an extent that it can ultimately be applied to every individual. This hope, however, I cannot share. The problems of autoscopy are confined within exceedingly narrow limits; their determining factors are well known, and I have expounded them sufficiently in this monograph. The limitations of autoscopy are of an anatomical nature, and the structure of our bodies will scarcely accommodate itself to our wishes. If we cannot get the tongue out of the way toward the front, we shall have to look over it,—that is, around a curve,—and for this purpose a mirror or a prism is absolutely indispensable; thus, we come back to where we started. I know of but one way in which any special advance over the results already achieved is possible. By drawing the angle of the patient's mouth sideways

toward his ear with a retractor, applying the spatula over the lower molars to the base of the tongue, and pressing the corresponding half of the tongue forward, we sometimes obtain a very good side-view of the larynx, even in persons who are poor subjects for ordinary autoscopy. This *lateral* autoscopy is worth further attention. In this connection I can also recommend, as a useful aid in the examination of the lateral portions of the pharynx, the tonsillar region, etc., the drawing back of the angle of the mouth on the opposite side; this is done by the physician or by the patient himself, either with a finger or with a retractor. In other respects I now consider the *problems of autoscopy definitely settled*,—until, at least, an entirely new *creative thought* arises to open up a new path.

RÉSUMÉ.

1. The human larynx and trachea can be examined autoscopically; that is, they are accessible to *direct* inspection; the means to this end is pressure on the tongue.

2. The individual adaptability to autoscopy varies within wide limits; the reasons are of an anatomical nature.

3. Laryngoscopy is no longer the only method of examining the air-passages as hitherto; but it will continue to be the standard method and the one to be used above all others for the purpose of diagnosis.

4. Autoscopy is an important addition to laryngoscopy, especially for examining the posterior wall of the larynx and the trachea.

5. In the examination of children autoscopy is indispensable in some cases; especially with the aid of chloroform anæsthesia, it can be carried out without any great difficulty.

6. *In endolaryngeal and endotracheal surgery*

autoscopy will take the front rank as the standard method; of course, within its anatomical limits.

7. The technique of laryngoscopic operations remains the same, and must continue to be used in those patients who are ill-adapted to autoscopy.

APPENDIX.

THE FIRST AUTOSCOPIC OPERATION ON A TUMOR OF THE VOCAL CORD.

Mrs. Wilhelmine König, æt. 39, small, slender, ill-nourished; had been coughing for three years; had hæmoptysis two years ago; had been hoarse since August, 1895. Dullness

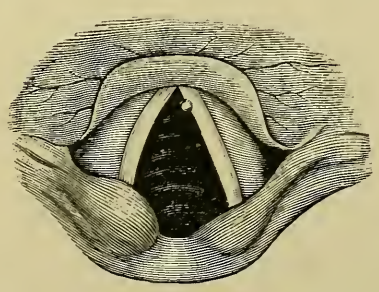


FIG. 11.—TUMOR OF VOCAL CORD.

over the right apex down to the second rib; respiratory murmur weak; no râles. Sputum not obtainable. Upper teeth carious and partly lost. Marked hoarseness. Examination with the laryngoscope revealed a condition reproduced in the illustration. (Fig. 11.) The right arytenoid cartilage was tipped considerably

forward; the right vocal cord was immovable in the cadaveric position and its free edge was concave. The left vocal cord possessed normal mobility, and during phonation extended only to the median line. In its anterior portion, close to the anterior commissure, was a pink, round tumor, the size of a millet-seed, and dotted on its apex with a small, red point. The tumor was attached to the edge of the vocal cord, and was movable. The patient could be examined with the autoscope so well that the tumor, notwithstanding its unfavorable locality, could be readily seen as the autoscope was introduced.

Operation.—On October 26, 1895, the larynx was cocainized by instillation of a 20-per-cent. solution of cocaine (without the aid of a mirror). The autoscopic intra-laryngeal spatula fastened to the electroscope was passed behind the epiglottis and controlled with the left hand. The tumor was seized and removed with the greatest ease with a small, cutting, double curette (in the straight tube and handle of Krause). The patient was not aware of the operation, which lasted but a few seconds.

Result of the operation: The left vocal cord is now normal. The hoarseness was little improved at first, as was to be expected in a case of paralysis of the recurrens on the right side. Four weeks after the operation the left vocal cord began to approach the paralyzed cord during phonation. Since the beginning of December, 1895, return of the voice, notwithstanding the continuance of the paralysis of the recurrens. During phonation the left vocal cord now comes in contact with the right cord. By the middle of January, 1896, the paralysis had disappeared and the patient was entirely restored.

ADDITIONAL NOTES OF THE TRANSLATOR.

I. A FOREIGN BODY REMOVED FROM THE LARYNX BY THE TRANSLATOR.

Mr. C. F. B., æt. 24, consulted me on March 25, 1896. He stated that while eating some stewed chicken, two days before, he suddenly felt something "go the wrong way." He had subsequently a severe coughing spell and some choking sensations, which, however, soon subsided. In order to remove the foreign body an emetic had been taken, but without avail. Since that time he had had occasional coughing spells, but felt otherwise well. He was sure, he stated, that a foreign body, probably a bone, was somewhere lodged in his throat, although there was no difficulty in swallowing, nor any pain worth mentioning.

The patient was a strong, young man, of more than average size. No signs of distress were noticeable. There was no dyspnœa, nor

any tenderness of the neck on pressure. The voice was slightly husky. Laryngoscopic examination revealed, in the extremely large larynx, a longitudinal piece of bone, the one end of which seemed to be imbedded in the right ventricle, while the other end leaned against the left ary-epiglottic ligament. The upper end seemed not to be impacted. It was evident that this patient's larynx was not very irritable. The autoscope was introduced with the medium-sized hood attached. No cocaine was deemed necessary. It was possible to grasp the foreign body readily with a slender, serrated forceps in Krause's straight tube and universal handle, and to lift it out of the larynx and remove it together with the autoscope. The removed piece of bone was nearly four centimetres long. The whole operation took but a few seconds.

II. LATEST IMPROVEMENTS IN AUTOSCOPY.

While the preceding pages were going through the press Dr. Kirstein published some modifications of his method,* which I append,

* Therapeutische Monatshefte, July, 1896.

in abstract, in order to bring this essay up to date:—

The main impediments to a thorough examination of the deeper portions of the throat are, as has been previously pointed out, the tongue and the epiglottis. If we were able to remove these impediments there would be nothing to prevent an inspection (and possibly a palpation), through the mouth, of the laryngo-tracheal tract. Kirstein has now fully demonstrated that this principal impediment — the tongue — can be removed from the pathway of straight rays of light, thrown directly into the laryngo-tracheal tube, a great deal farther than we had ever suspected. The amount of displacement, it is true, varies greatly in different subjects.

It has lately been found that for ordinary examination a complicated appliance is not necessary. A tongue-depressor, constructed on the lines of the one shown on next page, will, in most cases, be sufficient. The patient should be seated, should tilt the head slightly backward (as described on page 21; see also Figs. 6 and 9), and the physician stands before the

patient. The spatula is then placed far back upon the tongue,—as far as possible,—and a firm pressure in a downward and forward direction is exercised upon the root of the tongue, whereby a deep and slanting groove is formed along the back of the tongue, thus allowing the rays of light to fall in line with

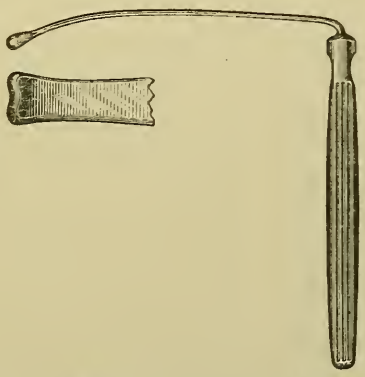


FIG. 12.—TONGUE-DEPRESSOR FOR PHARYNGOSCOPY AND DIRECT LARYNGO-TRACHEOSCOPY.

Side-view and surface-view of the anterior portion. In some cases an instrument with a larger curve of the anterior portion is more practicable.

an imaginary laryngo-tracheal axis. With proper illumination we are now enabled to get a good view of the air-passages. The extent of this view depends, of course, upon the individuality of the patient, as stated in a previous chapter (page 29), and upon the skill of the examiner. Many apparently unsurmount-

able difficulties may be overcome by patience and practice.

There are, however, some tongues which are so "stubborn," as it were, that it is well-nigh impossible to completely overcome their resistance to this manipulation. As the source of illumination we may use an ordinary forehead-reflector, or, still better, Kirstein's electric forehead-lamp (Fig. 2). If during this examination the upper lip or a moustache should obstruct the vision, the other hand will readily remove this obstacle.

In this way we shall be enabled to see, in the vast majority of cases, the posterior wall of the larynx; in a good many cases the posterior two-thirds of the vocal cords can be seen, and, although rarely, the whole interior of the larynx, including the anterior commissure of the vocal cords, is exposed to a thorough inspection.

The extent to which the trachea may be seen is larger or smaller in proportion to the view obtained of the interior of the larynx. There are, however,—and we must not forget it,—certain limitations to this method which

we cannot overcome, also not by brusquely increasing the pressure upon the tongue; although we may, in cocainized patients, during operations, be a little more energetic.

For simple autoscopic examination the spatula, or tongue-depressor, alone will be sufficient. As this tongue-depressor is available also for ordinary pharyngoscopy, there is, in reality, nothing needed for autoscopy which we do not already possess in our armamentarium. The more complicated instrument described on page 15 will henceforth be used more especially for *operations, clinical demonstrations, and in the examination of children.*

In this connection it may be repeated that the laryngological examination of children will immeasurably be aided by the autoscopic method. The larynx and trachea can be examined, in children who are anæsthetized, with such thoroughness as was never before possible.

It is frequently feasible, especially in young children, to dispense altogether with the anæsthesia, and yet to get a good view of the laryngo-tracheal tube.

In conclusion, it must be repeated that autoscopy is an art that requires study and practice: **the art of pressing into the tongue with a minimal amount of irritation a longitudinal groove, reaching backward and downward as far as possible, and approximating in direction to the axis of the laryngo-tracheal tract.**

Autoscopy of the Larynx and the Trachea. (Direct examination without mirror.) By ALFRED KIRSTEIN, M. D., of [illegible] Authorized Translation (altered,